BS EN 60294:2012

BSI Standards Publication

Measurement of the dimensions of a cylindrical component with axial terminations

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN 60294:2012. It is identical to IEC 60294:2012. It supersedes BS 5692:1979 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee EPL/40X, Capacitors and resistors for electronic equipment.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Published by BSI Standards Limited 2012

ISBN 978 0 580 73103 7

ICS 31.020

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2012.

Amendments issued since publication

Amd. No.	Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60294

October 2012

ICS 31.020

English version

Measurement of the dimensions of a cylindrical component with axial terminations

(IEC 60294:2012)

Mesure des dimensions d'un composant cylindrique à sorties axiales
(CEI 60294:2012)

Bestimmung der Maße eines zylindrischen Bauelementes mit axialen Anschlüssen
(IEC 60294:2012)

This European Standard was approved by CENELEC on 2012-08-17. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 60294:2012 E

Foreword

The text of document 40/2154/FDIS, future edition 2 of IEC 60294, prepared by IEC/TC 40 "Capacitors and resistors for electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60294:2012.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2013-05-17
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow)	2015-08-17

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 60294:2012 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

IEC 60717	NOTE	Harmonised as EN 60717.
IEC 61192-3	NOTE	Harmonised as EN 61192-3.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

Publication	Year	Title	EN/HD	Year
IEC 60301	-	Preferred diameters of wire terminations of capacitors and resistors	EN 60301	-

CONTENTS

MEASUREMENT OF THE DIMENSIONS OF A CYLINDRICAL COMPONENT WITH AXIAL TERMINATIONS

1 Scope

This International Standard applies to cylindrical capacitors and resistors for use in electronic equipment.

This standard gives methods for measurement of the body length and for checking the excessive protective coating extending onto the wire terminations of components with axial wire terminations. It further provides a method for checking the overall body diameter of cylindrical components with axial wire terminations.

NOTE A measuring method for components with unidirectional terminations is given in IEC 60717.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60301, *Preferred diameters of wire terminations of capacitors and resistors*

3 Body length

3.1 General

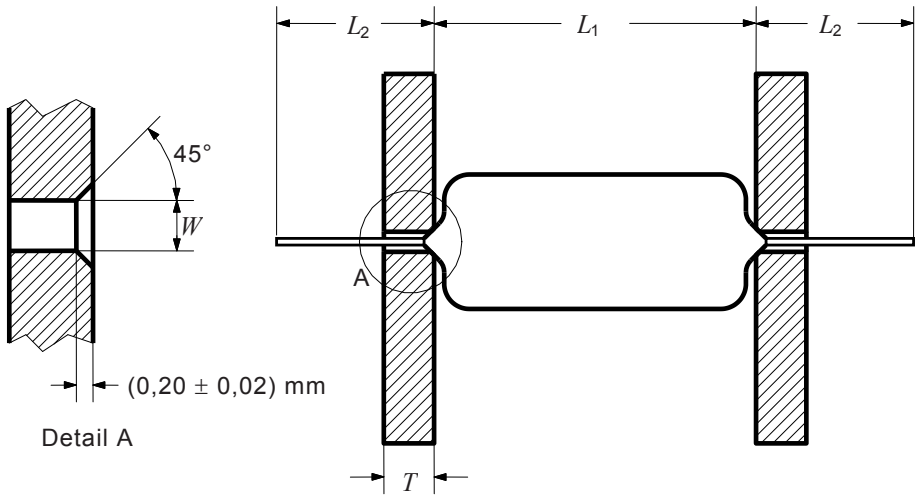
The length of the body shall be measured by inserting the wire terminations into slots or bores of a pair of gauge plates and by moving these plates parallel to each other until the component body is clamped without deforming the body or the wire terminations.

The plates shall be considered sufficiently close to parallel if, allowing for the size of plate and the distance between the component and the measuring device, the error in measurement due to this cause does not exceed 0,05 mm.

Components with axial wire terminations shall be measured using the standard gauge plates of 3.2, unless glass-metal seals or other discontinuities in the wire terminations require the use of the special gauge plate of 3.3.

3.2 Standard gauge plates for components with axial wire terminations

The gauge plate defined in Figure 1 shall be used for components with axial wire terminations, unless prescribed otherwise by the relevant specification.



Key

$L1$ Length of the component body

$L2$ Length of the wire terminations

T Thickness of the gauge plates

W Slot width or bore diameter

Figure 1 – Standard gauge plates

The width of the slot, or the diameter of the bore in the gauge plates, W, shall be selected from Table 1, according to the nominal diameter of the wire termination.

Table 1 – Slot width or hole diameter for standard gauge plates

Diameter d [a] of the wire terminations	**Slot width W [b] in the gauge plates**
$d \leq 0{,}45$ mm	(0,80 ± 0,02) mm
0,45 mm $< d \leq$ 0,70 mm	(1,00 ± 0,02) mm
0,70 mm $< d \leq$ 0,90 mm	(1,20 ± 0,02) mm
0,90 mm $< d \leq$ 1,15 mm	(1,50 ± 0,02) mm
1,15 mm $< d \leq$ 1,32 mm	(1,80 ± 0,02) mm
1,32 mm $< d \leq$ 2,00 mm	(3,00 ± 0,02) mm

[a] Nominal diameter of the lead wire, permissible tolerance on the diameter d according to IEC 60301.

[b] Dimension W is the bore diameter if the gauge plates are made with cylindrical holes instead of slots.

The prescribed tolerance of the slot width or bore diameter W only needs to be maintained near the prescribed inner chamfer of the slot or hole.

The length of the component body L_1 shall be taken as the distance between the inside faces of the gauge plates.

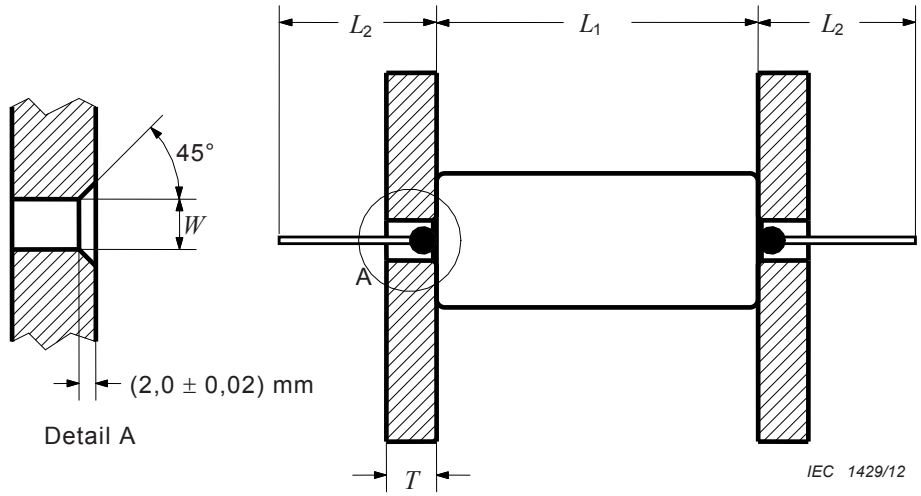
The thickness T of the gauge plate shall be sufficient to ensure mechanical stability and precision of the measurement; it has no significance to the length measurement. Unless otherwise specified by the relevant specification, the thickness T shall be

$$T = (4{,}0 \pm 0{,}05) \text{ mm}.$$

The determination of the free length of a wire termination, L_2, should be based on the same reference plane which is used to measure the length of the component body, i.e. the inner surface of the gauge plate.

3.3 Special gauge plates for components with glass-metal seals or other discontinuities in their axial wire terminations

The gauge plate defined in Figure 2 shall be used for components with discontinuities in their axial wire terminations, e.g. glas-metal seals or external welds, unless otherwise prescribed by the relevant specification.



Key

$L1$ Length of the component body
$L2$ Length of the wire terminations
T Thickness of the gauge plates
W Slot width or bore diameter

Figure 2 – Special gauge plates

The length of the component body L_1 shall be taken as the distance between the inside faces of the gauge plates.

Unless otherwise specified by the relevant specification, the width of the slot, or the diameter of the bore in the gauge plates, W, shall be

$$W = (4{,}0 \pm 0{,}02) \text{ mm}.$$

The prescribed tolerance of the slot width or bore diameter W only needs to be maintained near the prescribed inner chamfer of the slot or bore.

The thickness T of the gauge plate shall be sufficient to ensure mechanical stability and precision of the measurement; it has no significance to the length measurement. Unless otherwise specified by the relevant specification, the thickness T shall be

$$T = (4{,}0 \pm 0{,}05)\ \text{mm}.$$

The determination of the free length of a wire termination, L_2,should be based on the same reference plane which is used to measure the length of the component body, i.e. the inner surface of the gauge plate.

4 Coating material extending onto wire terminations

If the relevant specification permits the extension of coating material onto the wire terminations, it shall prescribe a permissible length of excessive coating on a wire termination, c_{max}. If not prescribed directly, the permissible length shall be determined from

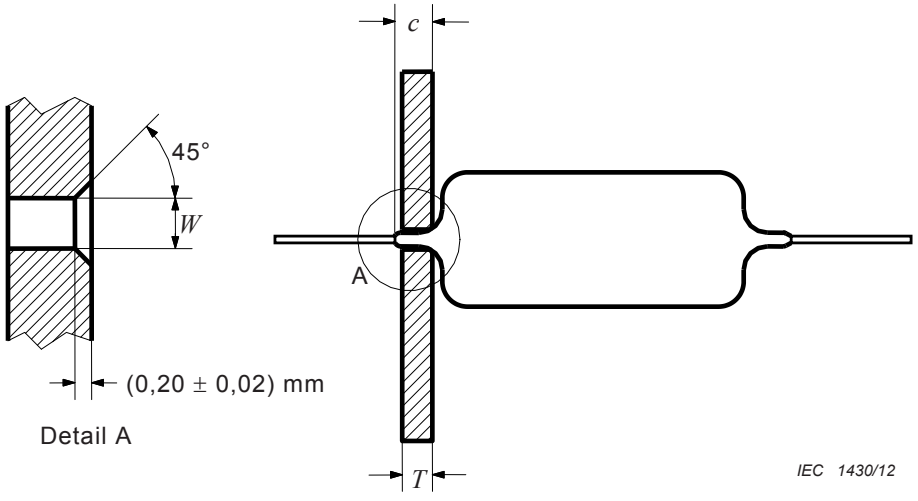
$$c_{max} = \frac{L_c - L_1}{2}$$

where

L_c is the maximum component length between clean leads, as prescribed by the relevant specification;

L_1 is the length of the component body.

Compliance of a component's coating material extending onto the wire terminations with such a prescribed maximum permissible extension length shall be checked by visual inspection of the wire termination protruding perpendicularly through the dedicated gauge plate, which is pressed against the component body without deforming the body or the wire terminations, see Figure 3.



Key

c Length of the excess coating on the wire terminations

T Thickness of the gauge plates

W Bore diameter or slot width

Figure 3 – Gauge plate for checking coating material extended onto a wire termination

The diameter of the bore, or the width of the slot in the gauge plates, W, shall be selected from Table 1 according to the nominal diameter of the wire termination.

The thickness T of the gauge plate is determined by the permissible length of excessive coating to be checked

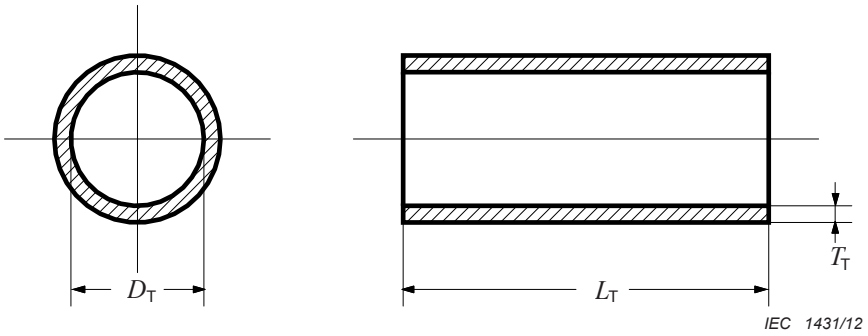
$$T = (c_{max} \pm 0{,}05 \text{ mm})$$

where

c_{max} is the maximum length of coating on the wire termination, as prescribed by the relevant specification.

5 Overall body diameter

Compliance of a component's overall diameter with a prescribed maximum body diameter shall be checked by passing the component through a straight tube diameter gauge, as shown in Figure 4.



Key

D_T Inner diameter of the straight tube

L_T Length of the straight tube

T_T Wall thickness of the straight tube

Figure 4 – Straight tube diameter gauge

The orifice of the diameter gauge is formed by the inner diameter D_T of the straight tube, with

$$D_T = (D_{max} + 0{,}1 \text{ mm}) \pm 0{,}05 \text{ mm}$$

where

D_{max} is the maximum component body diameter, as prescribed by the relevant specification.

The maximum diameter of the component, as given by the relevant specification, needs to take into account the permissible irregularities in the shape of the body, such as bow, caps on resistors and wire wrapping as part of the terminations of ceramic capacitors, etc.

The length L_T of the straight tube shall meet the following requirement

$$L_T \geq L_{max}$$

where

L_{max} is the maximum component body length,as prescribed by the relevant specification.

The wall thickness T_T of the straight tube shall be sufficient to ensure mechanical stability and precision of the measurement. The outer shape of the straight tube may deviate from the cylinder shown in Figure 3 as long as the prescribed dimensions are maintained.

The component shall pass through the gauge by its own weight.

6 Information to be given in the relevant specification

When this method is applied in a relevant specification, the following details shall be given as far as they are applicable:

		Clause
a)	the dimension(s) to be measured	3, 4, 5
b)	the thicknes of the gauge plate(s)	3.2, 3.3, 4
c)	the bore diameter or slot width	3.2, 3.3, 4

Annex A
(informative)

Cross-reference

The revision of this standard has resulted in a new clause numbering. Table A.1 provides cross-references between the clause numbering of this edition compared to the first edition of this standard.

Table A.1 – Cross reference

IEC 60294:1969 1st edition Clause	**IEC 60294:2012 2nd edition** Clause	**Notes**
1	1	Scope and object are merged into one
2		
—	2	New clause
3	3	—
4	4	—
5	5	—
—	6	New clause

Bibliography

IEC 60717, *Method for determination of the space required by capacitors and resistors with unidirectional terminations*

IEC 61192-3, *Workmanship requirements for soldered electronic assemblies – Part 3: Through-hole mount assemblies*

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

Useful Contacts:

Customer Services
Tel: +44 845 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 845 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

bsi.

...making excellence a habit.™